



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/501,117	01/14/2005	Takeo Okabe	OGOSH-19USA	5689
270	7590	07/10/2008	EXAMINER	
HOWSON AND HOWSON SUITE 210 501 OFFICE CENTER DRIVE FT WASHINGTON, PA 19034			IP, SIKYIN	
			ART UNIT	PAPER NUMBER
			1793	
			MAIL DATE	DELIVERY MODE
			07/10/2008	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/501,117	<b>Applicant(s)</b> OKABE ET AL.	
	<b>Examiner</b> Sikyin Ip	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 3,4,7,8,16-19,23,24 and 27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 3,4,7,8,16-19,23,24 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3, 4, 7, 8, 16-19, 23-24, and 27 are further rejected under 35 U.S.C.

§ 103 as being unpatentable over JP 06-177128 in view of USP 6451135 to Takahashi et al.

JP 06-177128 discloses the features including the claimed Al containing Cu alloy and resistivity (abstract). The Cu alloy is formed by sputtering ([0010]-[0011]). JP 06-177128 does not disclose the recited x-ray diffraction ratio and grain size. However, Takahashi discloses to control grain size (col. 2, lines 35-38), x-ray diffraction ratio (col. 2, lines 39-44), and processing steps (col. 5, Example 1) in the same field of endeavor or the analogous metallurgical art for uniformity of film thickness (col. 2, lines 25-28). Therefore, it would have been obvious to one having ordinary skill in the art of the cited references at the time the invention was made to control grain size and x-ray diffraction ratio as taught by Takahashi because the set forth benefits and function entail the motivation of one skilled in the art to make a claimed sputtering target, in the expectation that compounds similar in structure will have similar properties. In re Venner, 120 USPQ 193 (CCPA 1958), In re LaVerne, et al., 108 USPQ 335, and In re Aller, et al., 105 USPQ 233. In re Gyurik, 596 F.2d 1012, 1018, 201 USPQ 552, 557 (CCPA 1979); See In re May, 574 F.2d 1082, 1094, 197 USPQ 601, 611 (CCPA 1978) and In re Hoch, 57 CCPA 1292, 1296, 428 F.2d 1341, 1344, 166 USPQ 406, 409 (1970).

### ***Response to Arguments***

Applicant's arguments filed March 31, 2008 have been fully considered but they are not persuasive.

Applicants' argument with respect to the "underwater cooling step" in page 9 of instant remarks is noted. But, the claimed I(111)/I(200) ratio is anticipated by teaching of Takahashi (abstract). Moreover, applicants fail to provide persuasive reason why

Art Unit: 1793

"thin film wiring copper alloy" of JP '128 cannot be used as a seed layer of a semiconductor device.

More specifically, JP'128 requires its copper alloy sputtering target to contain up to 20wt% of Al

Applicants argue that " for the purpose of providing oxidation resistance. "

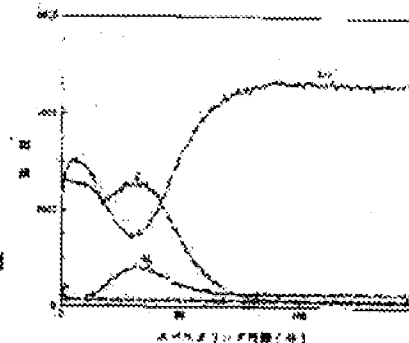
But, it is found inconsistent with the teaching of JP '128 below:

**(54) SEMICONDUCTOR DEVICE AND FABRICATION THEREOF**

**(57)Abstract:**

**PURPOSE:** To establish a technology allowing heat treatment required for enhancement of oxidation resistance at a specified temperature or below when a copper wiring material is used in a semiconductor device.

**CONSTITUTION:** In a semiconductor device having a thin film wiring of copper alloy containing 0.02-20 atomic % of aluminium and/or 0.02-20 atomic % of silicon, surface oxide is formed on the thin film wiring by heat treatment at 500°C or below. Al or Si is diffused from bulk part and concentrated in the oxide which thereby functions as a barrier layer against oxidation. The wiring bulk part resembles pure copper because Al or Si is diffused to the surface thereof thus exhibiting low resistance, EM resistance, and SM resistance inherent to copper. The copper alloy wiring thus formed has resistivity of 10 $\mu\Omega$ .cm or below and oxidation resistance thus dealing with high integration of future semiconductor device.



20 atomic % is about 9.5 wt.% not 20 wt.%. Nonetheless, Takahashi discloses crystalline orientation would affect the uniformity of film thickness (col. 3, line 65-col. 4, line 15). Furthermore, applicants do not show the claimed Al content is critical for the claimed X-ray diffraction ratio.

Applicants' argument with respect to resistivity is noted. But, the resistivity disclosed by JP '128 overlaps the claimed resistivity and resistivity of Takahashi.

Applicants argue that the examples of Takahashi failed to disclose the claimed grain size. But, examples of the cited reference are given by way of illustration and not by way of limitation. Moreover, Takahashi teaches to control grain size less than 250  $\mu\text{m}$  (col. 2, lines 25-38).

## Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USP 6391163 to Pavate et al is cited to show that the claimed Cu-Al sputtering target (col. 3, lines 20-29), resistivity (col. 1, lines 29-36), grain size (col. 3, lines 1-4), and x-ray diffraction ratio are parameters known to be optimized by known methods.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 1793

Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

#### Examiner Correspondence


Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Ip whose telephone number is (571) 272-1241. The examiner can normally be reached on Monday to Thursday from 5:30 A.M. to 4:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Roy V. King, can be reached on (571)-272-1244.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Sikyin Ip/  
Primary Examiner, Art Unit 1793

July 7, 2008

<b><i>Application Number</i></b> 	<b>Application/Control No.</b>	<b>Applicant(s)/Patent under Reexamination</b>	
	10/501,117	OKABE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Sikyin Ip	1793	